FIRE ISLAND NATIONAL SEASHORE
5TH BIENNIAL SCIENCE AND CULTURAL RESOURCE CONFERENCE

ABSTRACTS FOR THE COASTAL AND ESTUARINE PROCESSES SESSION, WEDNESDAY, APRIL 6, 2005, 1:30 – 4:30 PM

Presenting authors are indicated by bold text

THE COASTAL GEOMORPHOLOGY OF FIRE ISLAND: A PORTRAIT OF CONTINUITY AND CHANGE

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The coastal geomorphology of Fire Island is both simple and complex. Its evolution of development is similar to other East Coast barrier islands, however, it is affected by local environmental controls, including wave climate, sediment supply, sediment budget, and sea-level rise. In general, it is a long narrow barrier island with well developed ocean beaches dominated by a variety of dune features. In places the morphology is related to former inlet locations or washover areas that interrupt the continuity of the dune. While much of the island remains undeveloped, it is interlaced with residential communities that have altered the landscape and geomorphological processes. Studies of shoreline positions from 1870 to the present (Allen, et. al., 2002) give insight into the changes and patterns of variation in erosion and deposition. There are general trends of erosion, displacement and accretion as the island migrates to the west. In addition, circulation cells may have significant impacts on local morphologies. The present situation is that there is insufficient sediment coming to Fire Island from all of the potential sources to maintain the entire system. The recent acceleration in sea-level rise coupled with the general negative sediment budget will result in continued beach erosion and dune displacement, with greater effects occurring in the eastern portion of the island.

EFFECTS OF BULKHEADS ON THE BAY SHORE OF FIRE ISLAND NATIONAL SEASHORE

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High natural rates of erosion on the bay shore of Fire Island and shore-parallel bulkheads built to protect human structures contribute to loss of beach and landward habitats. This project is

designed to assess the effects of these bulkheads on park resources and provide guidelines for constructing bulkheads or employing alternative shore-protection strategies. A major component of the study is a detailed field investigation (14 to 25 October 2004) of sand transport and beach changes at a bulkhead on the east side of Cherry Grove. Wave and current dynamics, sand transport and beach changes were evaluated in front of and adjacent to the structure. Data were gathered on wind speed and direction, wave heights, longshore currents, sediment transport, beach topography and characteristics of sand on the beach and eroding upland. Wave reflection off the structure is conspicuous, but there is little difference in depth of scour on the bay bottom adjacent to the structure relative to locations away from it. The most conspicuous changes occur on the upper beach near the shore-perpendicular portion of the structure that traps sediment moving alongshore. Pronounced cycles of erosion and accretion occur with shifts of wind direction from northwest to northeast. Erosion occurs along most of the shore of Fire Island that exists in the wider part of Great South Bay where local wave heights are relatively great. Bulkheads increase the mobility of beaches right next to them, but are only one of the factors contributing to long-term erosion of the bay shore.

SUBMARINE GROUNDWATER DISCHARGE ALONG FIRE ISLAND, NY

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Submarine groundwater discharge (SGD) across the sea floor can be a significant source of freshwater, dissolved nutrients and dissolved contaminants to the coastal ocean. In the summer of 2004, SGD was measured at Talisman and Sailors Haven on Fire Island. The freshwater lens is about 7 m thick, underlain by saltwater in the Upper Glacier Aquifer. Preliminary measurements had been made in 1980 at Talisman, but no previous measurements had been made at Sailors Haven. Along a barrier island shoreline SGD can be driven by (1) groundwater seepage out of freshwater lens, (2) upward leakage of groundwater from the deeper aquifers, or (3) seepage driven under the freshwater lens by the tides. Seepage devices designed to measure SGD are benthic chambers that are vented to collection bags. At Talisman, both flow from the freshwater lens and flow driven under the lens by the tidal difference were prevalent; there was a strong modulation with the tide. The highest rate was measured closest to shore as expected to be indicative of seepage from the freshwater lens. Flow rates also varied with the tide; low tide corresponding to a high SGD (up to 15 cm/day) and high tide to negative SGD (up to -5 cm/day; i.e. groundwater seepage from the bay to the ocean under the freshwater lens). At Sailors Haven the device closest to shore also show the highest upward seepage rate, and varied, as expected, with the tides. However, flow rates increased, unexpectedly offshore from values less than 8 cm/day to more than 15 cm/day. The high SDG offshore may reflect upward seepage from deeper aquifers.

CONSERVING AND MANAGING THE LIVING MARINE RESOURCES OF FIRE ISLAND NATIONAL SEASHORE

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Fire Island National Seashore encompasses within its administrative boundaries the nearshore waters of the Atlantic Ocean and Great South Bay. These marine and estuarine environments support a diverse assemblage of living marine resources (LMRs) and the habitats upon which these species depend. Heretofore, the park has not directed much attention at the conservation and management of LMRs or LMR habitat. Under a cooperative agreement with The National Park Service, the authors prepared a white paper to serve as a blueprint for the development of the LMR element of a forthcoming new General Management Plan (GMP) for Fire Island National Seashore. This paper presents the salient findings, conclusions, and recommendations of that white paper. Among the topics addressed are: a general description of the Great South Bay and nearshore Atlantic ecosystems; key LMR species, species assemblages, and essential habitats found within the park; the history and present status of commercial and recreational fisheries within or near the park and their impact on target resource species; review of other federal, state, and municipal agencies with jurisdictions adjoining and/or overlapping those of the park, and their LMR-related programs, policies, and activities; and identification of priority LMR management issues for the park with recommendations for procedural and/or substantive strategies and actions to address these issues.

WHAT IS THE NATURE CONSERVANCY DOING IN GREAT SOUTH BAY?

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The Nature Conservancy recently acquired title to approximately 13,000 acres of underwater lands in the central Great South Bay from the parent corporation of the Bluepoints Company. Recognizing this as an unprecedented opportunity to explore the effectiveness of alternative strategies for restoring the health of the Great South Bay ecosystem, The Conservancy formed the Bluepoints Bottomlands Council to assist in the planning and implementation of large-scale restoration efforts. The Council is comprised of Federal, State, County, and Town natural resource managers, local baymen, academic scientists, and non-government organizations. The Council is in the process of preparing an ambitious plan to restore and manage key ecological targets such as hard clams and seagrass meadows in the bay. The planning process has already led to several restoration projects and the final plan will become an important component of the South Shore Estuary Reserve Comprehensive Management Plan. This presentation will explain what work has been accomplished to date and what The Conservancy and the Bluepoints Bottomlands Council hope to accomplish in the future.